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**(19) (CA) APPLICATION FOR CANADIAN PATENT (12)**

**(54) Process for the Production of Low Fat and Low Calory  
Meat and Sausage Products Using Filtered Milk**

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Abstract

The invention concerns a process for the production of low fat and low calory meat and sausage products, in which a minced basic substance of meat is processed with frozen or strongly refrigerated, filtered milk and optionally with water.

2001992

Process for the Production of Low Fat and Low Calory  
Meat and Sausage Products Using Filtered Milk

The invention concerns a process for the production of low fat and low calory meat and sausage products, in which minced meat is processed with frozen or refrigerated milk and water.

More than 50 % of the population in the industrial states are overweight and suffer from the connected illnesses, such as heart and circulatory illnesses, metabolism illnesses, arteriosclerosis, diabetes, high blood pressure. The excessive weight, as a rule, is based on the consumption of too many foodstuffs and above all of foodstuffs with a too high content of fats and calories. The conventional sausage and meat products possess between 25 and 50 % of fat and energy content of from 250 to 500 kcal/100 g and therefore cause, when consumed, too high a fat and calory intake.

Nutritional-physiological reasons suggest that the fat and calory content in the consumer sausage and meat goods, which have, as fat/meat mixed products, almost always a significantly higher fat content by comparison with their protein content, should be reduced. This can be done by

replacing fat and bacon in the sausage and meat products by lean meat. However, such products are naturally very expensive and as regards their consistency and taste, they do not accord with the expectations of the consumer.

The critical magnitudes in meat processing or sausage manufacture are the water-binding capacity of the meat and the fat emulsification, which depend on the ratio of fat, water and protein in the mass. For a long time it was assumed that a lower fat content (less than 25 %) in the mass leads to a disadvantageous influence on the consistency, the appearance and the taste of the final product.

In DE 22 03 582 C2, DE 26 39 177.5, WO 85/03621 processes for the production of low fat and low calory meat and sausage products are described, in which a large part of the fat content is replaced by milk, milk products and/or milk powder. The milk and meat components complement each other advantageously with respect to the content of amino acids, fatty acids, vitamins, minerals and trace elements, so that nutrition-physiologically valuable products are obtained having a low fat content (3 to 7 g/100 g) and a low energy content (80 to 130 kcal/100 g), which also approach the conventional meat and sausage goods with respect to their sensory properties. The products are comparable with lean beef or pork, because they possess similar protein, fat and water values.

In the above named production processes, firstly the meat is minced in the machine and subsequently it is finely minced in the cutter with the addition of salt and ice. This meat mixture is now supplemented by corresponding amounts of milk (skimmed milk, full cream milk) or by milk products (skimmed milk powder, full cream milk powder,

curds, soft cheese, dissolved milk protein) and optionally further amounts of lean and high quality meat and the total mixture is homogenized in the cutter. The mass thus obtained can now be spiced, cooked, smoked and filled.

In the meat processing method in accordance with DE 26 39 177.5, the total mixture produced above is homogenized before the final processing with a cooled or frozen emulsion of milk formed in the cutter, dissolved milk protein (caseinate) and vegetable oil. This processing method leads to a further qualitative and quantitative nutrition-physiological improvement of the end product. According to WO 85/03621, it is advantageous to add to the homogenized total mixture of meat, water/ice, milk (products) a refrigerated or frozen emulsion of milk, milk powder, water and oil and then process it into the product for the consumer.

The problem in the preparation of the meat/milk products described above is that the usable amount of milk which is dependent on the water content of the milk is limited. For higher proportions of milk, the normal water-binding capacity of the conventionally processed meat is not sufficient, and the consistency of the product is too soft and/or the water output in the final product is too great. By the use of milk powder in the meat-water emulsion instead of normal milk, the dry substance share of the milk in the end product can be increased (WO 85/03621). However, it has been found that by using milk powder there is an increased lactose and milk salt input, which by using a high milk share has the result of a product which is too dry, too sweet and unpleasantly salty and which spoils relatively early when stored because of the formation of lactic acid. Furthermore, the milk powder is worked into the meat or sausage product via an emulsion

which is complicated to produce. The milk powder firstly has to be dissolved with water or with milk and then it must be emulsified. In addition, the mixture has to be heated, then the oil must be added, emulsified and finally either refrigerated or frozen. A further disadvantage is that the content of lactose, proteins and salts in the milk powder is predetermined, and the amounts of these components in the emulsions can only be varied or adapted by the addition of water and of fats. The proteins in the milk powder, moreover, are strongly denatured by the heating in many cases and, under certain circumstances, may lead to a burnt taste in the end product.

The invention is based on the object of providing a process for the manufacture of low fat or low calory meat and sausage products on the basis of milk, with which the dry substance share of the milk in meat or sausage product can be increased without having to accept concurrent disadvantages in the consistency, the appearance and the taste of the product. In particular, a process is to be made available by means of which the content of lactose, proteins and salts in the meat or sausage product can be varied, and with which the production cycle can be simplified.

This object is achieved in accordance with the invention by a process in which a minced basic mass of meat is homogenized and emulsified with milk, which has been filtered at a pressure of from 2 to 40 bar and with a pore magnitude of the filter membrane of from 0.3 to 100 nm, in the frozen or refrigerated state, optionally with water/ice, and the mass thus provided is then processed in the conventional manner into the final product.

The process described above permits the processing of any desired types of meat, wherein pork, veal and/or beef is preferred. It is also advantageous to use the meat of other warm-blooded animals such as, for example, horses and game.

For the manufacture of particular products it may also be advantageous to work into the mixture of meat or meat components, filtered milk and optionally water/ice, in addition, fish products and/or grain, vegetable or fruit products.

A further advantageous embodiment of the present invention consists of homogenizing frozen and/or deep-refrigerated milk firstly with a minced basic mass of meat and optionally fish products and/or grain, vegetable or fruit products, optionally with water, and then to filter the milk together with the entire mass. When using this process it is preferable to adjust the homogenized amount subsequently by means of filtration to a dry substance content of up to 57 % and then to spice, cook and fill it in the manner known per se. It is frequently found in this embodiment to be advantageous to use acidified milk which is acidified for example by a starter culture addition or by natural acidification. The acid is then separated by the filtration process.

In a special embodiment of the process in accordance with the invention, the meat is optionally tumbled initially and then is separated into water-soluble protein and connective tissue protein by pressing, centrifuging, passing, squeezing or other similar measures, wherein the connective tissue protein is dissolved by the use of milk, electrolyte solutions, salt solutions, protein solutions or geoceric acid solutions or mixtures thereof as the

dissolving intermediary and subsequently superfluous water, salts, acids, electrolytes are separated from this solution by centrifuging and/or filtration and/or by other suitable processes, before the water-soluble meat and the dissolved connective tissue are processed with the addition of milk, filtered milk, water/ice and other additives into a basic substance. By using this variant of the process, the optimal solvents are added to the connective tissue share of the meat, making possible a further dissolution. At the same time, however, these solvents are not desired in the end product and can again be eliminated by using this process. The dissolution of the connective tissue share of the meat by mincing and the addition of water/ice and dissolving intermediaries causes a substantial improvement in the quality of the product by the subsequent separation.

In the process in accordance with the invention, the amount of filtered milk, depending on the processing method employed, is preferably adjusted to a ratio by weight of 0.01 : 1 to 20 : 1 in relation to the amount of meat or in relation to the amount of the mixture of meat/fish/grain, vegetable and fruit products.

The filtration of the milk, granted the conditions in accordance with claim 1, has the effect that low molecular components, for example salts, water, lactose are preferably allowed to pass through the membrane, whereas the high molecular substances, such as proteins for example, are preferably retained by the membrane. The membranes which are suitable for this process are conventionally composed of cellulose acetate, synthetic polymers or metal oxides. During the filtration, the milk is separated into a protein-rich fraction (the retentate) and a low protein or protein-free fraction (the permeate).



The retentate which is concentrated with respect to the protein content should be understood as filtered milk.

Compared with normal milk, the filtered milk possesses a clearly increased protein content and substantially lower amounts of water, salts and lactose. The smaller amount of water has the effect that the filtered milk can be bound in larger quantities of meat, without the precipitation of water.

The use of filtered milk leads to the fact that owing to the content of proteins which in any case is higher and owing to the increased take-up by the meat, the protein content of the final product can be increased by simple means. Because the lactose content in the filtered milk is simultaneously reduced, there is no spoilage of the goods caused by lactic acid formation during storage when using larger quantities of lactose, such as is frequently the case when using milk powder.

A further advantage of the process in accordance with the invention is that, depending on the filtration conditions (filter material, pore size, pressure) the content of protein, lactose and salt in the filtered milk and therefore in the end product can be controlled, whereas these contents are fixed, when using milk powder.

Furthermore, the production and processing of the filtered milk can take place at a temperature in the physiological range, so that no denaturing of the proteins and vitamins results and therefore there is no disadvantageous influence on the taste and on the quality of the meat or sausage products.

For example, in the production of the meat or sausage products, the filtered milk in the frozen or refrigerated state is mixed, homogenized and emulsified in the cutter or any other suitable device with minced meat and optionally with water/ice and optionally with fats/oil. A further process consists of mixing the as yet unfiltered milk firstly with the minced meat and optionally water/ice and optionally fats/oil, and then of filtering the entire substance. Examples are described below for the production of meats when using filtered milk.

Example 1: production of low fat boiled sausage

10 kg meat  
10 kg frozen or refrigerated, filtered milk  
+ salt (+ phosphate when using cold meat)  
+ spices

Example 2: production of low fat cooked sausage

3 kg cooked meat  
3 kg liver  
4 kg refrigerated, filtered milk  
+ salt  
+ spices

Example 3: production of raw sausage

10 kg frozen beef  
0.1 - 10 kg frozen, filtered milk  
+ salt  
+ spices  
+ optionally starter culture

Example 4: production of boiled sausage using specially separated meat and connective tissue

Meat and connective tissue are dissolved/washed from bones with milk and/or water and salt and optionally with electrolytes and/or geoceric acids at high pressure. The solution/suspension thus obtained is then very finely minced, homogenized and is adjusted to a dry substance content of up to 80 % by means of filtration, optionally in combination with centrifugation or another suitable separation process.

5 kg of this substance are processed with  
5 kg meat  
5 kg refrigerated/frozen filtered milk  
+ salt  
+ spices

into a paste.

Example 5: production of a bacon-type basic substance as an additive for sausages, meat goods, patés and other foodstuffs

- a) 10 kg of separated connective tissue and 40-80 kg frozen/refrigerated milk are very finely minced and are homogenized with suitable amounts of water and salt and are subsequently adjusted to a dry substance content of approximately 60 % by filtration, optionally in combination with centrifuging or another suitable separation process.

This substance, which is optionally previously refrigerated, frozen, freeze-dried or cooked, dried and refrigerated is used instead of

bacon/fat in the conventional manner in boiled sausage, cooking sausage, raw sausage or in patés and other foodstuffs. For the nutritional-physiological improvement, salts (electrolytes, spices, dietetic fat or oils or fat substitute (waxes etc.) can be added to the substance before or after the mincing.

- b) 10 kg connective tissue  
1-10 kg filtered milk or milk  
10-100 kg water/ice  
+ salt, optionally electrolyte, geoceric acids or sugar or mixtures thereof

are very finely minced in a cutter or in another suitable machine and are homogenized, then thickened to a mass of 11-60 kg by filtration, optionally in combination with centrifuging. This mass is mixed with 1-100 kg fat/bacon/oil and homogenized and is subsequently refrigerated, frozen, freeze-dried or cooked, dried and refrigerated and is used in any desired manner in the preparation of foodstuffs as an additive.

A larger or smaller share of the connective tissue can be replaced by vegetable substances (mucopolysaccharides, polysaccharides, fibers, agar, etc.).

Example 6: production of boiled sausage

10 kg meat  
40 kg refrigerated/frozen milk  
+ salts  
+ optionally electrolytes and/or lactose and/or geoceric acids

are very finely minced and homogenized and are then adjusted by means of filtration to a dry substance content of approximately 35 %. This mass is spiced and prepared in the conventional way.

Example 7: production of boiled sausage

10 kg meat  
5 kg bacon substitute from example 5  
6 kg frozen milk  
+ salt  
+ spices

Example 8: production of cooked sausage of the type of a liver sausage/liver paté

3 kg meat  
3 kg liver  
6 kg bacon substitute from example 5  
+ salt  
+ spices

The production is carried out in the conventional manner or in a cooking cutter with subsequent homogenization.

Example 9: production of tongue sausage/"Pressack"  
("Thuringian sausage")

3 kg cooked tongue  
3 kg cooked jaw meat  
3 kg blood  
3 kg bacon substitute from example 5  
+ salt  
+ spices

Example 10: production of raw sausage

10 kg frozen beef  
3-10 kg frozen bacon substitute from example 5  
+ salt  
+ spices  
+ optionally a starter culture

Example 11: production of fish sausage

5 kg fish meat (deep frozen + phosphate)  
5 kg meat  
10 kg filtered milk (cooled)  
+ salt  
+ spices

Example 12: production of fish paté

10 kg fish meat  
5-20 kg filtered milk  
+ salt  
+ spices

Example 13: production of fish fingers/imitation crevette

10 kg fish meat (deep frozen + phosphate)  
10-30 kg bacon substitute from example 5 or  
5 kg filtered milk  
+ salt  
+ spices

The filling or forming is performed as fingers or in any other desired form. Then the product is heated and packed.

Example 14: production of a fruit-milk substance as added ingredient for meat and sausage products

10 kg bananas without skin  
0.1-100 kg filtered milk  
+ electrolyte/salt/spices and optionally geoceric acids

are minced and homogenized, then cooled, frozen/freeze-dried or/and dried. The substance can be supplemented in the raw state by a starter culture (lactic acid-forming agent or the like).

Instead of bananas, fresh or dried, any desired type of fruit and vegetables and/or mixtures thereof, frozen or dried or as a concentrate can be used.

For example: raw salami

10 kg frozen meat  
5 kg freeze-dried or dried and frozen or heated and subsequently dried and frozen fruit-milk-substance  
+ salt  
+ spices  
+ optionally a starter culture

The filling is carried out either with large caliber or small caliber.

The maturing and smoking as well as the packing are carried out as usual.

Example 15: production of an added ingredient for boiled sausage, patés, raw salami or other foodstuffs

5 kg celery  
1 kg filtered milk  
+ salts/electrolyte  
+ spices

are very finely minced and homogenized, cooked in the cooking cutter and homogenized and are then shaped, dried/free-dried. Instead of celery, any desired type of vegetable or mixtures thereof can be used. The addition to the end products is carried out in desired amounts.

Example 16: production of a red ingredient for boiled sausage, patés, raw salami etc.

3 kg beetroot  
7 kg filtered milk  
+ salts/electrolyte  
+ spices

The preparation is carried out as in example 15. The addition to the end products is performed in desired amounts.

Example 17: production of a fruit-grain-mixture as added ingredient for sausage/meat products, patés and other foodstuffs

3 kg pineapple-core-substance  
1 kg rough ground or flaked grain (e. g. oats)  
6 kg filtered milk  
+ spices/electrolytes etc.



The mixture is prepared as in example 15 and is added to the end products in any desired quantity or is packed as a snack.

For example: "pineapple salami":

- 10 kg frozen beef
- 5 kg pineapple-grain-milk-mixture (dried, frozen)
- + salts
- + spices
- + optionally starter culture

Filling and maturing are performed in the conventional manner.

Example 18: production of a milk-grain-fruit preparation as an additive for meat/sausage products, patés and other foodstuffs (snack)

- 10 kg milk
- 10 kg fruit juice (orange or mixed)
- 1 kg fine rough ground grain or/and linseed
- + optionally electrolyte/spices

are homogenized and are then adjusted by filtration, optionally in combination with centrifuging or by another suitable process, to a dry substance content of approximately 55 %. After the addition of the spice substances and possibly of electrolytes, the substance is shaped, dried/freeze-dried or is heated and dried/freeze-dried and is packed/prepared as an additive for foodstuffs or as a snack.

**Example 19: Raw sausage with fruit additives**

for example:

10 kg frozen meat

4 kg frozen, filtered milk (about 40% dry substance)

4 kg freeze-dried or dried and refrigerated/frozen bananas

The meat and frozen milk are minced together with salt, spices and optionally starter culture in the cutter until a desired granulation is achieved, and the frozen bananas are added to this mixture and are further minced together to any desired granulation.

Filling, maturing and smoking are carried out as desired.

Instead of dried bananas, any fruit or/and dried, freeze-dried and/or cooked types of vegetable can be used at discretion.

**Example 20:**

Peeled potatoes are cut/diced and are subsequently cooked for a short period in water with ascorbic acid. Instead of ascorbic acid, other anti-oxidants can be used. After the cooking, the vegetable is dried or is freeze-dried.

10 kg frozen meat

1-5 kg frozen, filtered milk (about 40% dry substance)

+ salt + spices + optionally starter culture

are minced to any desired granulation in the cutter.

During the mincing

3-6 kg frozen diced potatoes, prepared as described above, are added.

2001992

- 17 -

Filling, maturing and smoking are performed in the conventional manner.

Instead of potatos, all types of vegetable, particularly the light types of vegetable such as celery, are suitable.

The meat and sausage products which are prepared in accordance with the examples are distinguished by a low fat and/or calory content and by good sensory qualities.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A process for the production of low fat and low calory meat and sausage products, in which a minced basic mass made of meat is mixed and emulsified with frozen and/or strongly refrigerated milk and optionally with water, wherein the production is carried out with the use of milk, which was filtered at a pressure in the range from 2 to 40 bar and with a pore size of the filter membrane in the range from 0.3 to 100 nm.
2. A process as set forth in claim 1, wherein pork, veal and/or beef is employed.
3. A process as set forth in claim 1, wherein fish (products) and/or grain and/or vegetables and/or fruit products are worked into the basic substance.
4. A process as set forth in one or more of the preceding claims, wherein the frozen or strongly cooled milk is initially homogenised with a minced basic substance of meat and optionally fish products and/or grain, vegetable or fruit products and optionally with water, and then the milk is filtered together with the entire substance.
5. A process as set forth in one or more of the preceding claims, wherein the meat is optionally initially tumbled and subsequently by means of pressing, centrifuging, passing, squeezing or by similar measures it is separated into water-soluble and connective tissue protein,

wherein the latter is dissolved by the use of milk, electrolyte solutions, salt solutions, protein solutions or geoceric acid solutions or mixtures thereof as the dissolving intermediaries, and subsequently superfluous water, salts, acids, electrolytes are separated from this solution by centrifuging and/or by filtration and/or other suitable measures, before the water-soluble meat and the dissolved connective tissue are processed into a basic substance with the addition of milk, filtered milk, water/ice and other additives.

6. A process as set forth in one or more of the preceding claims, wherein the amount of the filtered milk is adjusted to a weight ratio of from 0.01:1 to 20:1 in relation to the amount of meat and/or to the amount of the mixture of meat/fish/grain,vegetable and fruit products.